

REMARKS

Applicants have now had an opportunity to carefully consider the Office Action dated April 2, 2002. Re-examination and reconsideration are respectfully requested.

The Office Action

Acknowledgment was made to a claim for foreign priority under 35 U.S.C. §119(a)-(d) that all certified copies of the priority documents had been received and placed of record in the file.

Applicant's election of claims 1-7 and 11-12 in papers filed on January 10, 2002 was made final.

Claims 1-7 and 11-12 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Claims 1-3 and 11-12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sato et al. (U.S. Patent No. 5,770,900) in view of Kawamoto et al. (U.S. Patent No. 4,954,736).

Claim 4 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Sato et al. and Kawamoto et al. as applied to the base claim, and further in view of Mitcham et al. (U.S. Patent No. 5,877,578).

Claim 5 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Sato et al. and Kawamoto et al. as applied to the base claim, and further in view of Molnar (U.S. Patent No. 5,881,448).

Claims 6-7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sato et al. and Kawamoto et al. as applied to the base claim, and further in view of the level of skills of a worker in the art.

The Pending Claims Are Distinguished Over the Applied Art

As a brief review, the present application is directed to a rotor structure of a motor having an inner rotor, which uses a high-performance rare earth magnet but is low in costs and addresses problems associated with the use of rare earth magnets in such motors designed for high-speed rotation.

In the instant Office Action, the Examiner has rejected **Claims 1-7 and 11-12** under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The use of the term "type" in the phrase "an inner rotor type motor" was considered by the Examiner to be indefinite. Independent **claims 1 and 11** have been amended to more clearly point out and claim the subject matter that Applicant's claim as the invention.

Independent **claim 1** was also considered indefinite by the Examiner for the reason that the main clause was "a rotor structure" while the preamble phrase recited "an inner rotor type motor." Independent **claims 1 and 11** have been amended so that **claim 1** is directed to a motor structure having an inner rotor assembly while independent **claim 11** has been amended to be directed to a motor having an inner rotor assembly.

Dependent **claim 4** was considered indefinite for the use of the phrase "the sides of the segment magnets" and has accordingly been amended to make it clear that circumferential sides are being referred to, and to correct the antecedence problem with respect to the phrase "the sides."

Dependent **claim 5** has been rephrased by amendment according to the Examiner's suggestion so that the phrase "magnetization positioning means ... for magnetization of said segment magnets" now reads "magnetization positioning means ... for positioning magnetization orientation of said segment magnets."

Dependent **claim 7** has also been amended to read "rotor magnetic pole pitch" in place of "magnetic pole

pitch" which was considered by the Examiner to be indefinite.

For the aforementioned reasons, **claims 1-7 and 11-12** should now be in conformance with the requirements of 35 U.S.C. §112.

Independent **Claim 1**, as amended, recites a rotor rotatably disposed with a small gap from the pole teeth of the annular yokes and having a permanent magnet arranged opposite to the pole teeth, wherein the permanent magnet comprises a rare earth magnet further comprising a plurality of discrete segment magnets which are arranged apart from each other on an outer surface of the rotor with a thermoplastic material that fills a space between a rotor shaft and each segment magnet and a space between adjacent segment magnets. Similarly, independent **claim 11**, as amended, recites a rotor rotatably disposed adjacent the pole teeth of the annular yokes and having a permanent magnet arranged opposite the pole teeth, wherein the permanent magnet comprises a rare earth magnet further comprising a plurality of discrete segment magnets which are spaced from each other on an outer surface of the rotor by a thermoplastic material that fills a space between a rotor shaft and each segment magnet and a space between adjacent segment magnets.

In the instant Office Action, the Examiner has rejected independent **claims 1 and 11** under 35 U.S.C. §103(a) as being unpatentable over Sato et al. in view of Kawamoto et al. and asserts that Kawamoto et al. teaches a similar inner rotor assembly comprising a plurality of discrete magnet segments which are arranged apart from each other by thermoplastic material, wherein the inner circumferential edge of each magnet segment is longer than the outer circumferential edge to accommodate the fastening projections and the thermoplastic resin bonding therebetween.

Applicant respectfully traverses the Examiner's assertion with respect to Kawamoto et al. for the following reasons. It is an objective of the present application to provide a rotor structure that addresses

problems related to the use of a rare earth magnet in an inner rotor assembly as stated in the Summary on lines 1-3 of page 3. Neither Sato et al. or Kawamoto et al. teach solutions to the special problems incurred by the use of rare earth magnets as described in the Background of the present application. Independent claims 1 and 11 have been amended to include the limitation of a rare earth rotor magnet to clearly indicate the objective of the claims.

Furthermore, Kawamoto et al., on col. 3, lines 40-43, teaches a preferred rotor yoke 12 formed by stacking many yoke element sleeves, obtained by punching such magnetic material as silicon steel plate, and shaping the sleeves. In the present application, no rotor yoke is used in the rotor. Instead, a space between the shaft 3 of the rotor and each discrete segment magnet 4, and between adjacent segment magnets 4, are filled with resin 17 except the sleeve 12 as described from page 4, line 21, to page 5, line 7. Further, Kawamoto et al. provides a thermoplastic resin layer 18 only in a very small gap between the yoke 12 and the permanent magnet segments 17a-17d, and between the holding projections 13a-13d and the lateral sides of the magnet segments 17a-17d. The gap is set to be as small as 0.2mm wide in order to maintain a constant position of the permanent magnet segments 17a-17d from the shaft 11 of the rotor as described on col. 4, lines 3-37.

Still further, the magnet segments 17a-17d of Kawamoto et al. are supported by the adjacent holding projections 13a-13d of the yoke 12 while, in the present invention, each discrete magnet 4 is supported by a resin material 17 such as a non-magnetic material which is filled into the space between the two discrete magnets 4 as shown in Figures 4 and 6A. As described on page 3, lines 22-25 of the present application, the portion of the resin material 17 which holds segment magnets 4 serves as a relief for a resin pressure caused by molding. Kawamoto et al., however, does not teach any comparable feature with respect to the molded resin layer

18 formed between the yoke 12 and the permanent magnet segments 17a-17d, and it would be difficult for molded resin layer 18 to function in a manner similar to the above-described function of the resin material 17 of the present application.

Kawamoto et al. further describes the permanent magnet segments as disposed to have gaps remained at least partly in the periphery of the segments (col. 2, lines 66-68) and with each segment being separated from said yoke by a gap along at least a portion of its periphery (col. 6, lines 64-66). Being thus described, the molded resin layer 18 of Kawamoto et al. does not appear to function as a relief for the resin pressure as taught by the present application.

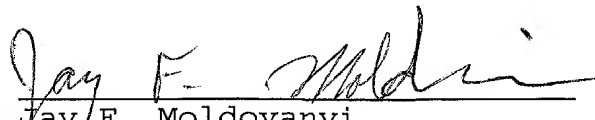
Yet further, the present application clearly describes the advantages of using segmented magnets (e.g. page 5, lines 16-27, page 6, line 26, to page 7, line 7, page 7 line 26 to page 8, line 13), however, no such teaching is found in Kawamoto et al.

Independent **claims 1 and 11** should, for the above-described reasons, be in condition for allowance, and **claims 2-7 and 12**, depending therefrom, should likewise be in condition for allowance.

For the reasons detailed above, it is respectfully submitted all claims remaining in the application are in condition for allowance. An early notice to that effect is therefore earnestly solicited.

Respectfully submitted,

Fay, Sharpe, Fagan,
Minnich & McKee, LLP


Jay F. Moldovanyi
Reg. No. 29,678
1100 Superior Avenue, 7th Floor
Cleveland, Ohio 44114-2518
(216) 861-5582